

Epidemiology of oral squamous cell carcinoma

SADJ November 2012, Vol 67 no 10 p550 - p553

MH Abram¹, WFP van Heerden², P Rheeder³, BV Girdler-Brown⁴, AW van Zyl⁵

SUMMARY

The National Cancer Registry (NCR) of South Africa publishes the pathology-based cancer incidence in the country and is the main cancer data source. The data published by the NCR have been used extensively in the development of the draft national guidelines for cancer prevention and control as well as for cancer research. The list of contributing pathology laboratories is fairly inclusive. Data from the NCR and the University of Limpopo, Department of Oral Pathology for the five years 1997-2001 were combined and then filtered for sites in the oral and oropharyngeal region. Age-Standardised Incidence Rates (ASIR) and the Cumulative Lifetime Risk (LR) for males and females in the different population groups were determined. Comprehensive reporting of oral and oropharyngeal cancer incidence will influence the allocation of government resources for prevention and treatment of oral cancers.

INTRODUCTION

Oral squamous cell carcinoma (OSCC) accounts for over 90% of oral cancers^{1,2} and therefore the term oral cancer (OC) is generally used to refer to OSCC. The National Cancer Registry (NCR) in South Africa was established in 1986. It publishes pathology-based cancer incidence in the country and is the main cancer data source. The data published by the NCR have been used extensively in the development of the draft national guidelines for cancer prevention and control as well as for cancer research.³ The last National

ACRONYMS

ASIR:	Age-Standardised Incidence Rates
CI:	Confidence Limit
CLR:	Cumulative Lifetime Risk
LR:	Life Risk
NCR:	National Cancer Registry
OC:	Oral Cancer
OPSCC:	Oro-Pharyngeal Squamous Cell Carcinoma
OSCC:	Oral Squamous Cell Carcinoma

Cancer Registry publication, titled 'Incidence of Histologically Diagnosed Cancer in South Africa, 1998-1999' was published in December 2004. The list of contributing pathology laboratories is reasonably inclusive. A number of studies on the ASIR of oral cancer have been done in South Africa.⁴⁻⁸ Some of the studies included specific race groups only,^{4,7,8} while others focused on specific geographic locations within South Africa.^{4,5}

LITERATURE REVIEW

Epidemiology

Oral cancer is the sixth most common cancer worldwide, being more common in developing than developed countries.⁹ Oral cancer generally refers to cancers of the oral cavity and the oropharynx. Worldwide, cancers of the oral cavity and oropharynx account for about 220 000 new cases per year in men (5% of all cancers) and 90 000 in women (2% of all cancers).¹⁰

OC causes more deaths than all other diseases and disorders of the oro-facial region combined. In spite of this, OC has not received adequate attention from either the medical or dental professions. This is probably due to the dental profession focusing its attention on the more common diseases of the oral cavity such as caries and periodontal infections, while for the medical community, OC comprises a very small percentage of all cancers.¹¹

Age and sex

OC occurs over a wide age range, with a peak incidence in the sixth and seventh decades. From 2000 to 2004, the median age of diagnosis in the US was 62 years.¹² In most countries, OC occurs more frequently in men than in women. This may be attributable to the heavier indulgence in risk habits by men.⁹

Several studies have found that the previously observed male predominance in cancers of the tongue is no longer

1. **MH Abram:** BDS(Wits), PDD(Clinical Dentistry)(Stell), DipOdont(Oral Surgery)(UP), Registrar, Periodontics and Oral Medicine, University of Pretoria.
2. **WFP van Heerden:** BChD, MChD, FC Path (SA) Oral Path, PhD, DSc. Department of Oral Pathology and Oral Biology, School of Dentistry, Faculty of Health Sciences, University of Pretoria.
3. **P Rheeder:** MMed, MSc, PhD. Head: Epidemiology and Biostatistics Track, School of Health Systems and Public Health, University of Pretoria.
4. **BV Girdler-Brown:** MBChB(Rhodesia), FFPHM (SA), MBA(UCT), MMed (UCT), HonsBCom(Econ)(UNISA), FFPH (UK). School of Health Systems and Public Health, Faculty of Health Sciences, University of Pretoria.
5. **AW van Zyl:** BChD (Stell) MChD (OMP) (Stell). Department of Periodontics and Oral Medicine, University of Pretoria.

Corresponding author

M H Abram:

Periodontics and Oral Medicine, University of Pretoria, 0084, South Africa. Tel: +27 12 319 2651, Fax: +27 12 329 3375
E-mail: mabram@sahcp.com

* Age-standardisation is a method of adjusting rates to take into account various age groups. It is an important aspect of Cancer Epidemiology.

the case in young individuals.^{13,14} The reason for this may be that habits such as drinking and smoking are now regarded as socially more acceptable amongst women than in the past.¹⁴ Studies of younger patients (arbitrarily aged less than 45 years) with OC also report a high proportion of female patients with no apparent risk factors.¹⁴⁻¹⁶ There is no consensus whether OC in the young is a distinct entity from that of older individuals or whether the causal factors and course of disease are shared.¹³

The aim of the present study was to determine the incidence of histologically diagnosed OSCC and oro-pharyngeal squamous cell carcinoma (OPSCC) in South Africa over the five-year period 1997-2001.

MATERIALS AND METHODS

Data from the NCR and the Department of Oral Pathology, University of Limpopo, were retrieved for the five years 1997-2001 and filtered for sites in the oral and oropharyngeal region. (The Department of Oral Pathology at the University of Limpopo was specifically approached as it had not submitted data to the NCR for 1997-2001). Cancers of the lip were not included in this study because lip cancers recorded by the NCR include those that have arisen from the skin, including the vermillion, as well as those arising from the labial mucosa. The differing aetiological risk factors of intra-oral cancer and cancer of the skin thus preclude the use of such data in this study.

Annual mid-term population estimates for the period by age and sex were obtained from the Actuarial Society of South Africa.¹⁷ All incidence rates were reported as age-standardised per 100 000 person-years at risk. To account for changes over time in age composition of the population, incidence rates were age-standardised using the direct method to the "world standard population".¹⁸ ASIR give greater insight into trends over time and are more useful for comparison between age groups and sexes. Some cases had incomplete data, i.e. population group, age, or sex was unknown. These were proportionally allocated to the known crude incidence rates.

The LR is the probability of developing a cancer in one's lifetime. Lifetime risk of OSCC and OPSCC was calculated using the cumulative approach for those aged 0-74.³ Poisson regression models were used to assess significance of trends in incidence between the different population groups and genders. White males and white females were used as the reference groups for males and females, respectively.

Confidence intervals (CI) for the ASIR were based on the gamma distribution as proposed by Fay and Feuer.¹⁹

Table 1: Incidence of histologically diagnosed and reported cases of OSCC and OPSCC in South Africa, 1997-2001, and their proportion to all cancers (excluding carcinoma of the skin)

	OSCC		OPSCC	
	Total	Proportion (%) to all cancers	Total	Proportion (%) to all cancers
Asian females	80	0.037	13	0.006
Asian males	71	0.033	25	0.012
Black females	576	0.266	136	0.063
Black males	2531	1.169	726	0.335
Coloured females	201	0.093	54	0.025
Coloured males	581	0.268	211	0.097
White females	472	0.218	85	0.039
White males	958	0.442	237	0.109
All females	1329	0.614	286	0.132
All males	4141	1.913	1199	0.554

Table 2: Proportion of cases <45 years old to all cases in group for OSCC and OPSCC.

	Proportion % OSCC	Proportion % OPSCC
Asian females	4.780	10.900
Asian males	0.000	2.600
Black females	8.150	8.440
Black males	6.970	5.980
Coloured females	7.840	11.450
Coloured males	5.890	5.550
White females	9.400	8.050
White males	8.590	7.510
Total males	7.280	5.200
Total females	7.840	11.170

RESULTS

The incidence of new OSCC and OPSCC cases in South Africa for the five year period 1997-2001 is shown in Table 1. OSCC in all South African males and females accounted for 1.913% and 0.614% of all cancers respectively, (excluding carcinoma of the skin), whereas new OPSCC in all South African males and females accounted for 0.554% and 0.132% of all cancers respectively (excluding carcinoma of the skin).

The incidence of new OSCC and OPSCC cases younger than 45 years old in South Africa for the five year period 1997-2001 is shown in Table 2. Males <45 years with OSCC comprised 7.276% of all male cases, whereas females <45 years with OSCC comprised 7.844% of all female cases. Males < 45 years with OPSCC comprised 5.195% of all male cases, whereas females <45 years with OPSCC comprised 11.170% of all female cases.

Table 3: ASIR per race group for OSCC in the male South African population for the five year period 1997-2001

Race	Total OSCC	Total population	Crude rate	ASIR	Lower CI	Upper CI
Asian	71	2784714	2.549	3.217	2.460	4.281
Black	2531	83100000	3.045	5.823	5.590	6.067
Coloured	581	9596217	6.052	10.164	9.320	11.088
White	958	11500000	8.347	6.849	6.419	7.309

Table 4: ASIR per race group for OSCC in the female South African population for the five-year period 1997-2001

Race	Total OSCC	Total population	Crude rate	ASIR	Lower CI	Upper CI
Asian	80	2864524	2.799	3.382	2.667	4.291
Black	576	88800000	0.649	1.005	0.923	1.092
Coloured	201	10100000	1.990	2.801	2.419	3.231
White	472	12000000	3.944	2.806	2.549	3.091

Table 5: ASIR per race group for OPSCC in the male South African population for the five year period 1997-2001.

Race	Total OPSCC	Total population	Crude rate	ASIR	Lower CI	Upper CI
Asian	25	2784714	0.898	1.322	0.84	2.148
Black	726	83100000	0.873	1.678	1.555	1.813
Coloured	211	9596217	2.199	3.805	3.288	4.404
White	237	11500000	2.065	1.704	1.493	1.946

Table 6: ASIR per race group for OPSCC in the female South African population for the five year period 1997-2001.

Race	Total OPSCC	Total population	Crude rate	ASIR	Lower CI	Upper CI
Asian	14	2864524	0.474	0.519	0.276	0.982
Black	135	88800000	0.152	0.23	0.192	0.274
Coloured	55	10100000	0.543	0.732	0.548	0.966
White	84	12000000	0.702	0.549	0.437	0.694

There is therefore a greater incidence with OPSCC in younger females < 45 years old when compared to younger males. The incidence of OPSCC in younger females is also greater than is the incidence of OSCC in both younger males and females.

Tables 3 and 4 show the ASIR for OSCC in males and females respectively. ASIR is highest for coloured males followed by white males. Among females, ASIR is highest for Asians. Of particular note is that there is a male preponderance among blacks, coloureds and whites but females are affected more frequently among Asians. White females have the second highest ASIR followed closely by coloured females.

Tables 5 and 6 show the ASIR for OPSCC in males and females, respectively. ASIR is highest for coloured males being more than twice that of any other race group. Among females the ASIR is highest for coloureds. White females have the second highest ASIR followed closely by Asian females. The population group with the highest ASIR for OPSCC for both genders is the coloured group.

The LR for developing both OSCC and OPSCC is highest for coloured males and lowest for black females and is shown in Tables 7 and 8.

Table 7: LR for developing OSCC in the South African population, based on 1997-2001 data.

Gender	Asian	Black	Coloured	White
Female	1:1628	1:3878	1:1160	1:1430
Male	1:512	1:483	1:212	1:460

Table 8: LR for developing OPSCC in the South African population, based on 1997-2001 data.

Gender	Asian	Black	Coloured	White
Female	1:217	1:847	1:314	1:309
Male	1:260	1:144	1:78	1:123

DISCUSSION

Analysis of the data provides minimal rates because only OC's that are histologically diagnosed are recorded by the NCR.³ Cases diagnosed clinically or by means of a death certificate are not included, resulting in an underestimation of the true burden of OC in South Africa.

In this study, we have calculated the age-specific and ASIR of OSCC and OPSCC separately. This was done to assess epidemiologic trends in cancer incidence between the two anatomical regions which may be of significance in the aetiology and prevention strategies for these cancers.

When compared with international ASIR, the ASIR for coloured males for OSCC (10.164) is similar to that of Puerto Rican males (10.6).²⁰ It is lower than that for males in Western Australia (14.6), USA (15.4), and France (32.2).^{9,12,21}

Globally, six percent of OC occur in young people under the age of 45 years.¹³ Our data revealed that in South Africa 7.276% of OSCC in males and 7.844% of OSCC in females occurred in those <45 years old. With regard to OPSCC our data revealed that Asian females and coloured females had a higher proportion of incidence in the younger (i.e.<45 year old) age group, viz. 10.9% and 11.45% respectively. The incidence of OPSCC in younger females was also higher than the incidence of oral cancer in both younger males and females.

The LR for developing OSCC for coloured males was very high (1:78). The LR for coloured males of developing OSCC was greater than the LR for colorectal cancer (1:97) and bladder cancer (1:108), whereas the LR for lung cancer was higher at 1:69.³ The LR for OPSCC for coloured males (1:212) was also extremely high when

compared with the LR for all other groups. This indicated that coloured males had significant exposure to risk factors for OSCC and OPSCC. Excluding LR for OSCC in the Asian population, males of all population groups had higher LR than females, implying that females had a lower indulgence in risk factor behaviour. Asian females, on the other hand, had a higher LR risk for developing OSCC than their male counterparts, implying higher indulgence in risk factor behaviour in this group.

CONCLUSION

The overall goal of OC prevention and control has to be a reduction in the incidence and mortality and to improve the quality of life of OC patients and their families. Efforts to control and prevent OC are hampered by the low priority frequently given to the disease by governments, the excessive reliance and expenditure on treatment, and a considerable imbalance between resources allocated for basic OC research and those devoted to its prevention and control.²² Early detection of OC increases the probability of early treatment, reducing morbidity and improving prognoses. The reported five-year relative survival rates for OC varied widely and are dependent on the clinical stage at time of diagnosis, from 81.8% for patients diagnosed with localised disease to 52.1% for patients with regional lymph node involvement to 26.5% for patients with metastatic cancer.²³ Comprehensive reporting of OC incidence should influence the allocation of government resources for prevention and treatment of OSCC and OPSCC. The prevalence of OC should justify the expense and effort required for the implementation of national preventive strategies and to provide the necessary facilities to confirm diagnosis and provide treatment.

Acknowledgements

We would like to thank the National Cancer Registry and Prof Erich Raubenheimer, Department of Oral Pathology, University of Limpopo for their kind help in providing the raw data.

Declaration: No conflict of interest declared

References

- Franceschi S, Bidoli E, Herrero R, Munoz N. Comparison of cancers of the oral cavity and pharynx worldwide: etiological clues. *Oral Oncol* 2000; 36: 106-15.
- Moore SR, Johnson NW, Pierce AM, Wilson DF. The epidemiology of mouth cancer: a review of global incidence. *Oral Dis* 2000; 6: 65-74.
- Mqoqi N. Incidence of Histologically diagnosed Cancer in South Africa 1998-1999. National Cancer Registry of South Africa 2004; National Health Laboratory Service.
- Altini M, Kola AH. Age-specific and age-standardised incidence rates for intraoral squamous cell carcinoma in blacks on the Witwatersrand, South Africa. *Community Dent Oral Epidemiol* 1985; 13: 334-9.
- Fleming D, Shear M, Altini M. Intraoral squamous cell carcinoma in South Africa. *J Dent Assoc S Afr* 1982; 37: 541-4.
- Hille JJ, Shear M, Sitas F. Age standardized incidence rates of oral cancer in South Africa, 1988-1991. *J Dent Assoc S Afr* 1996; 51: 771-6.
- Schonland M, Bradshaw E. The incidence of oral and oropharyngeal cancer in various racial groups. *J Dent Assoc S Afr* 1968; 23: 291-5.
- van Wyk CW, Stander I, Padayachee A, Grobler-Rabie AF. The areca nut chewing habit and oral squamous cell carcinoma in South African Indians. A retrospective study. *S Afr Med J* 1993; 83: 425-9.
- Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. *Oral Oncol* 2009; 45: 309-16.
- Petersen PE. Strengthening the prevention of oral cancer: the WHO perspective. *Community Dent Oral Epidemiol* 2005; 33: 397-9.
- Hobdell MH, Oliveira ER, Bautista R, et al. Oral diseases and socio-economic status (SES). *Br Dent J* 2003; 194: 91-6; discussion 88.
- Institute NC. Surveillance epidemiology and end results (SEER). SEER Stat Fact Sheets 2003-2007. 2010.
- Llewellyn CD, Johnson NW, Warnakulasuriya KA. Risk factors for squamous cell carcinoma of the oral cavity in young people--a comprehensive literature review. *Oral Oncol* 2001; 37: 401-18.
- Postma TC, Van Heerden WF. Is the human papillomavirus a mutual aetiological agent in oral and cervical squamous cell carcinoma? *Anticancer Res* 2003; 23: 3509-12.
- Bleyer A. Cancer of the oral cavity and pharynx in young females: increasing incidence, role of human papilloma virus, and lack of survival improvement. *Semin Oncol* 2009; 36: 451-9.
- Girod A, Mosseri V, Jouffroy T, Point D, Rodriguez J. Women and squamous cell carcinomas of the oral cavity and oropharynx: is there something new? *J Oral Maxillofac Surg* 2009; 67: 1914-20.
- Dorrington RE JL, Bradshaw D, Daniels T. The Demographic Impact of HIV/AIDS in South Africa: National and Provincial Indicators for 2006; Cape Town: Centre for Actuarial Research, South African Medical Research Council, Actuarial Society of South Africa; 2006. .
- Doll R PP, Waterhouse JAH. Cancer Incidence in Five Continents. 1966; Volume 1.
- Fay MP, Feuer EJ. Confidence intervals for directly standardized rates: a method based on the gamma distribution. *Stat Med* 1997; 16: 791-801.
- Suarez E, Calo WA, Hernandez EY, Diaz EC, Figueroa NR, Ortiz AP. Age-standardized incidence and mortality rates of oral and pharyngeal cancer in Puerto Rico and among non-Hispanics Whites, Non-Hispanic Blacks, and Hispanics in the USA. *BMC Cancer* 2009; 9: 129.
- Abreu LP, Kruger E, Tennant M. Oral cancer in Western Australia, 1982-2006: a retrospective epidemiological study. *J Oral Pathol Med* 2010; 39: 376-81.
- Petersen PE. Oral cancer prevention and control--the approach of the World Health Organization. *Oral Oncol* 2009; 45: 454-60.
- Rethman MP, Carpenter W, Cohen EE, et al. Evidence-based clinical recommendations regarding screening for oral squamous cell carcinomas. *J Am Dent Assoc* 2010; 141: 509-20.

Remember
SADA AGM
 7 March 2013
 Sunnyside Park Hotel
 Parktown
 Johannesburg